

PALLID STURGEON RECOVERY UPDATE

- the latest research and management actions for recovery -

Editor's Notes

It has been over 2 years since the previous issue of the Pallid Sturgeon Recovery Update was written in November, 1993. In this current issue, I summarize priority activities conducted over the past 2½ years that relate to recovery of the pallid sturgeon and/or other elements of the ecosystem upon which it depends. Refer to the back page for a Table of Contents. Because there is so much material to report, in most cases I just describe the activity and then list a contact person for additional information. I am sure that there is pallid sturgeon recovery-related material I neglected to report on. Let me know if I missed something you would like reported, and I will include it next time.

Many things have transpired making it impossible to meet my original objective of keeping all interested parties informed of recovery actions by writing three issues of the Update each year. On the top of that list was government downsizing. Need I say more? Future issues of the Update will be written annually, which I will send out in late March or early April of each year.

Recovery Plans Still Available

The Pallid Sturgeon Recovery Plan was signed as approved by US Fish and Wildlife Service Regional Director, Ralph Morgenweck, on November 7, 1993. The Recovery Plan was mailed to all parties on the Update mailing list in 1993. If

you did not receive a copy, or lost yours and want another, contact Sharon Schweigert (USFWS), 701-250-4419.

Systematic Sampling for Sturgeon and Other Native Fishes

The Montana Department of Game, Fish and Parks (MTDFWP), through funding provided by the Western Area Power Administration, are in their third year of a study to systematically sample stations in Montana and North Dakota on the Missouri River between Lake Sakakawea and Ft. Peck Dam, and on the lower Yellowstone River. The study objectives are: 1) to investigate relationships between shovelnose sturgeon, pallid sturgeon and other aquatic organisms in relation to river reach, discharge, habitat type, season and physical habitat characteristics, 2) monitor larval drift of sturgeon and other fish, 3) identify pallid sturgeon spawning locations on the Missouri River above the Yellowstone River confluence, and 4) assess the population status of adult pallid sturgeon on the Missouri River above the Yellowstone River confluence.

In 1995, under objective 1, a total of 238 drifts captured 843 fish. Sixteen species were caught, including 10 pallid sturgeon, 444 shovelnose sturgeon and 21 blue sucker. A total of 89 seine hauls

captured 28 species, with longnose sucker and white sucker most common. Also captured were flathead chub, sicklefin chub, sturgeon chub and blue sucker. No young-of-year sturgeon were caught. Aquatic invertebrates were sampled to gather baseline information on food available to benthic feeding fish. Thirteen orders, representing 36 families were identified. Habitat measurements collected at each site included secchi disc, water temperature, depth, velocity, conductivity and substrate type. Under objective 2, larval fish were sampled at established stations with the aid of 0.5 meter round and 0.8 meter D-ring plankton nets. Eighty-nine samples contained larval sturgeon, paddlefish, catostomid species, cyprinids, stonecats, and numerous unidentified eggs. Under objectives 3 and 4, no pallid sturgeon were captured. However, turbulent, rocky areas that could hold promise for spawning were located in the Missouri and Milk rivers. Contact: Jim Liebelt (MTDFWP), 406-526-3471.

Share what you are doing for conservation of pallid sturgeon and/or other elements of its ecosystem. Submissions of articles and associated materials are welcome. Please send a hard copy or disc copy (preferred) to Mark Dryer, 1500 Capital Avenue, Bismarck, North Dakota, 58501.

Pallid Sturgeon Inventory Above Ft. Peck Reservoir

Through funding provided by the US Fish and Wildlife Service and MTDFWP, a study to evaluate the status of the pallid sturgeon in the Missouri River between Ft. Peck Reservoir and Ft. Benton, Montana, was continued in 1995. Study objectives related to pallid sturgeon are: 1) to locate and define pallid sturgeon spawning, juvenile and adult habitat areas, 2) to document population size, seasonal movements and evidence of recent reproduction, 3) to evaluate environmental impacts associated with development projects.

Results are presented in a 19-page report for the period July 1, 1994, to June 30, 1995. Pallid sturgeon were sampled by either trammel nets or set lines. Four adults were captured in 1994; all were recaptures. Four were captured in 1995; one was a recapture. Attempts were made to locate sturgeon rearing areas by seining and trawling a variety of habitats in the lower reaches of the study area. A total of 101 completed seine hauls sampled 3,726 fish representing at least 17 species. Flathead chub were the most common species collected. No sturgeon were sampled in seine hauls. Trawling was used to sample deep water habitats of the main channel. A total of 139 hauls sampled 527 fish, representing 12 species. Longnose dace, sturgeon chub and sicklefin chub dominated the catches. One young-of-year sturgeon was sampled over a sand bottom in 8.9 feet of water flowing at 1.5 ft/sec.

Larval samples were obtained using boat-mounted, 20-inch diameter plankton net samplers. A total of 112 samples captured 309 larvae, representing at least 7 species. Catastomid species were most common. Eight larval sturgeon were collected.

Pallid sturgeon were targeted in the Ft. Peck headwaters area; however, none were captured. Contact: Bill Gardner (MTFWP), 406-538-8359.

Sturgeon Held Over-Winter in Ponds

A random assortment of 100 pallid sturgeon from a spawn at Blind Pony SFH in 1993 were held over winter, under ice cover, at Garrison Dam NFH in Riverdale, North Dakota. The objective was to investigate over-winter survival in an earthen pond at northern latitudes, and test effectiveness of a short-term external marking technique.

On April 22, 1994, the 3-acre pond was drained. In total, 92 of 100 sturgeon were recovered. Average length increased from 309mm to 327mm and weight increased from 110gm to 150gm.

On July 1, 1993, one pectoral fin from 25 of the sturgeon was punched with a paper punch to investigate the effectiveness of this marking technique, short term. Eighty-eight percent of the marked sturgeon showed a recognizable mark. Contact: Steve Krentz (USFWS), 701-250-4419.

Sturgeon Documentary

Ms. Betty Wills, Earth Wave Productions, has just completed a one-hour documentary on seven of

North America's sturgeon, titled "Sturgeon: Ancient Survivors of the Deep". The documentary is intended for non-profit educational purposes and for broadcast on public television. The production is narrated by James Drury and provides an excellent background into the problems sturgeon are facing across the country and measures taken to recover and protect declining populations. For more information, or to view the VHS video, contact Mark Dryer (USFWS), 701-250-4419.

Pallid Sturgeon Spawning Unsuccessful

In 1994, and again in 1995, attempts were made to spawn pallid sturgeon captured from the Missouri and Yellowstone Rivers region of North Dakota and Montana. In 1994, one female pallid sturgeon held at Gavins Point NFH since September, 1993, and four males were injected with LHRH in anticipation of a spawn. The female expelled less than twenty eggs and died a few days later. Cause of death is unknown, but suspected it could have occurred as a result of eggs plugging the oviduct. This is known to happen when spawning paddlefish.

In late April 1995, two female and two male pallid sturgeon were captured from the Yellowstone River and transported to Miles City SFH for spawning. When the sturgeon were first biopsied to determine sex and stage of maturity, the eggs were green and not expected to mature for three to five weeks. Upon a return visit three weeks later, the eggs in both females were found to be in an advanced stage of reabsorption. The females were returned to their

point of capture. After failing to capture more females, the males were also returned to their point of capture. Reports on procedures and results were prepared in both years.

The US Fish and Wildlife Service is planning for a third attempt this spring. For more information contact Herb Bollig (USFWS) at 605-665-3352, or Mark Dryer at 701-250-4419.

Repository Established for Sturgeon

The US Fish and Wildlife Service has entered into a cooperative agreement with the Ichthyology Museum at the University of Alabama to be the central repository for deceased pallid sturgeon. The Museum has dedicated an ultra-cold freezer for proper and safe storage of the pallid sturgeon. Researchers may obtain samples for genetics and other analyses after obtaining permit authorization from the Fish and Wildlife Service. For more information contact Mark Dryer at 701-250-4419 or Dr. Richard Mayden (University of Alabama), at 205-348-5960.

Pallid Sturgeon Recovery Team Met

In June 1994, the Pallid Sturgeon Recovery Team met to: 1) review results of past genetics studies on Scaphirhynchus species utilizing the expertise of invited specialists in fish population biology and genetics science, 2) make a recommendation on how to proceed with recovery after review of study results, and 3) address recovery progress and needs in the Recovery Plan.

Two previous genetic studies by Phelps and Allendorf (1983) and Morizot (1994) could not distinguish the two species with nuclear genetic markers. The invited specialists reviewed the previous study results and recommended a follow up study analyzing a rapidly evolving portion of the mitochondrial DNA (D-loop) to better identify the genetic basis for the observed morphologic and behavior characteristics observed between these two species. The Recovery Team supported continued work toward recovery of the pallid sturgeon as genetic studies are being conducted, and concluded that the taxonomic and behavior characteristics that describe the species are valid. Progress on recovery in areas of propagation, outreach, protection and management were also discussed. Contact: Mark Dryer, 701-250-4419.

New Genetics Results

In a study recently completed by the Department of Fisheries and Aquatic Sciences at the University of Florida, Dr. Donald Campton and other researchers have found the first genetic evidence that the pallid sturgeon (Scaphirhynchus albus) and shovelnose sturgeon (S. platyrhynchus) are reproductively isolated in the Missouri River and Yellowstone River confluence area of North Dakota and Montana. Previous genetic studies could not separate the species genetically, which suggested the pallid could be a rare morphotype of the shovelnose, or that testing methods were inadequate.

Although the data supports reproductive isolation in less altered habitats, the data also

reveals pallid and shovelnose sturgeon exhibit only about half the amount of sequence diversity observed among individuals of white sturgeon. And, the sequence divergence between green and white sturgeon is approximately 20 times greater than that observed among pallid, Alabama, and shovelnose sturgeon. Based upon their findings, the researchers support the current efforts to protect the pallid sturgeon as an endangered "species" or "distinct population segment" as outlined by the Endangered Species Act of 1973, and subsequent amendments. For a copy of the report, contact Mark Dryer at 701-250-4419. Specific questions related to analysis procedures and data interpretations should be directed to Dr. Campton at 904-392-9617.

Thyroxine Content Measured in Shovelnose Sturgeon

Shovelnose sturgeon eggs, larvae and fry being reared at Valley City and Gavins Point National Fish Hatcheries in 1995 were collected at scheduled intervals for analysis of thyroxine levels. Early results reveal that thyroxine levels are slightly elevated during the hatching period. This analysis is being conducted by Dr. Allan Scholz of Eastern Washington University. The purpose of this research is to determine if thyroid hormone-induced olfactory imprinting is occurring in shovelnose sturgeon, and if it is, at which stage of development. This information will be important to know in planning future pallid sturgeon reintroduction. Analyses of additional samples are needed. Contact: Steve Krentz, USFWS, 701-250-4419.

Recovery Work Groups Organized

In September 1993, a Pallid Sturgeon Upper Basin States Workgroup was organized to focus recovery efforts among participating organizations in Montana, North Dakota and South Dakota. The Upper Basin Group meets annually to review recovery progress and make recommendations on priority recovery actions that are to receive funding. Funding agencies include the Western Area Power Administration, Bureau of Reclamation, Fish and Wildlife Service, Army Corps of Engineers, North Dakota Game and Fish Department, and Montana Department of Fish, Wildlife and Parks. Priorities are systematic sampling for sturgeon, propagation, and population assessments (see above reports).

In January 1995, interested State and Federal agencies from Nebraska, Kentucky, Illinois, Missouri, and Kansas met in Columbia, Missouri to discuss organization of a Central States Work Group. Agency representatives recommended against formation of another "committee" or group and instead recommended that the Paddlefish/Sturgeon Subcommittee of MICRA (Mississippi Interstate Cooperative Resource Association) serve the function of annually reviewing recovery progress and making recommendations on priority recovery actions. The group proposed three priorities: 1) to determine pallid sturgeon distribution, habitat selection, population size and health in the central states; 2) characterize pallid sturgeon movements and migratory behavior; 3) characterize

habitat use and distribution of other benthic fishes.

The Fish and Wildlife Service has crafted a Memorandum of Agreement with MICRA and provided initial funding to states for objective number 1. Field activities will begin in spring of 1996. The National Biological Services (NBS) office in Columbia, Missouri, and Southern Illinois University - Carbondale have initiated telemetry studies to address priority number 2 (see reports on page 11) and the Army Corps of Engineers (COE) has contracted with Fishery Cooperative Research Units in Missouri, South Dakota and Montana to address priority number 3 (see report that follows). Planning on the NBS and COE studies had begun prior to the Central Work Group Meeting. For additional information on the central states' activities for pallid sturgeon recovery, contact Kim Graham (MDC) at 573-882-9880.

Army Corps of Engineers Funds Research on Population Structure and Habitat Use of Benthic Fishes

For this study, the Missouri River has been divided into eight river sections based on geomorphic and constructed features (e.g. major tributaries, dams) from the mouth of the Marias River in Montana to the Missouri's confluence with the Mississippi River. In each river section, six macro habitats have been selected for analysis during year one and include main channel, outside bend, inside bend, tributary mouth, connected secondary channel, and non-connected secondary channel

(backwater). The objectives of this study are : 1) to describe and evaluate recruitment, growth, size structure, body condition, and relative abundance of selected benthic fishes within and among study sections and along segments, and 2) to describe habitat use of benthic fishes and availability of dominate benthic macro habitats within and among study sections and segments. Fish sampling will be conducted within river segments using a stratified random sampling approach. Physical parameters to include water depth, water velocity, substrate form, bed form, air and water temperature, turbidity, conductivity, cover, location, river stage and weather will be collected, measured or described in conjunction with all fish sampling to identify fish habitat use within macro habitats and among study segments and sections. This is a 5-year study that was initiated in part last year but will be fully implemented this field season. Contact Doug Latka, (COE), 402-697-2477.

Pallid Sturgeon Catch Record Database Updated

The Missouri River Fish and Wildlife Management Assistance Office of the Fish and Wildlife Service in Bismarck, North Dakota maintains a range-wide database on pallid sturgeon catch records in dBASE format. The database is current through 1994, and will soon be up to date through 1995. When information was obtainable, records have data on catch date and location; fish length, weight, morphologic and meristic characters; gear type; tag number; and other information. For copies of the database, contact Steve Krentz (USFWS), 701-250-4419.

Stocked Pallid Sturgeon Reported

On March 9 and 10, 1994, the Missouri Department of Conservation stocked approximately 7,000 fingerling pallid sturgeon to the Missouri and Mississippi Rivers in Missouri. The fish came from a spawn at Blind Pony SFH in spring, 1993. Since the stocking, 41 tagged sturgeon have been reported by commercial fishermen and anglers. All recaptures have been reported downstream of the release sites and have come from Missouri, Illinois, Arkansas, and Tennessee. Recapture sites are targeted for additional surveys and habitat evaluations as part of the MICRA cooperative study on sturgeon in the lower Missouri and Mississippi Rivers (see page 6 in this Update). Contact: Kim Graham, MDC, 573-882-3227.

Stocking Plan Guidelines

The Fish and Wildlife Service has completed a planning document that provides background and guidance when preparing stocking plans for pallid sturgeon. The document recommends a standard format or outline that when followed will describe how, when, why and where stocking actions will take place. This format ensures consideration of the benefits and risks of a stocking action; it ensures consistency across the species' range; and it attempts to maintain genetic integrity of wild stocks. Different reasons for stocking can be to reintroduce populations into areas where they once existed, to augment existing populations, to provide for experimental

populations, to provide for temporary refugia, and to establish populations into new areas.

The guidelines recommend preparation of six stocking action plans that have a geographic coverage comparable to the six recovery priority management areas identified in the Pallid Sturgeon Recovery Plan. The upper basin states of Montana, North Dakota, and South Dakota will be meeting soon to begin preparing stocking action plans for recovery priority management areas 1, 2, and 3 on the Missouri River, which extends from above Fort Peck Reservoir in Montana to Gavins Point Dam in South Dakota. If propagation of upper basin pallid sturgeon is successful in 1996, experimental stocking could take place in 1997. For more information contact Mark Dryer at 701-250-4419, or Sharon Whitmore (author), (USFWS) at 605-224-8693.

Sturgeon Propagation at Natchitoches NFH

The Fish and Wildlife Service at Natchitoches NFH, and the Louisiana Department of Wildlife and Fisheries at Lake Charles, have partnered on a project to hold and spawn pallid sturgeon to meet recovery objectives. Initially, shovelnose sturgeon are being used as a surrogate to test holding capability and perfect spawning techniques. During fall 1995, 11 shovelnose sturgeon were captured from the Atchafalaya River and held at Natchitoches NFH over winter. On February 26-29, 1996, six mature adults (1 female & 5 males) were injected with LHRH to induce ovulation. Water temperature was 55° F. Ovulation did not occur. Additional attempts

at capturing and spawning shovelnose sturgeon will be made this spring. Contacts: Karen Kilpatrick (USFWS), 318-352-5324, or Bobby Reed (LA DWF), 318-491-2577.

Upper Missouri and Yellowstone River Hydrology Study

The Bureau of Reclamation, National Biological Service and the Montana Department of Fish, Wildlife and Parks have agreed to cooperatively undertake studies to identify operational criteria for maintenance of the Upper Missouri/Lower Yellowstone River ecosystem. Study objectives are: 1) to develop a computer-aided Decision Support System (DSS) with graphical display to interface proposed hydrologic scenarios from Reclamation reservoir operations models to key resource responses in each river segment, 2) to develop predictive capabilities to allow users to understand changes in community structure and function on the basis of changes in flow regime, temperature, and sediment dynamics, 3) to develop and validate a variety of community habitat indices derived from 2-dimensional habitat characteristics, 4) to estimate the long-term channel response to changes in reservoir operations within study segments, 5) to determine if differences in the abundance of large river benthic fishes are related to sediment dynamics, temperature or flow regime differences between the relatively unregulated Yellowstone River compared with the Missouri River, 6) to expand the 2-dimensional habitat mapping to include all segments affected by Reclamation operations including tail water

fisheries immediately below Reclamation dams, and 7) to design experimental releases from selected Reclamation facilities to verify the net change in habitat availability, temperature and sediment transport as a function of flow (this design will drive phase II experimental analyses and validation efforts once the DSS is built). Field work will begin this spring. For more information contact Tom Parks (Bureau of Reclamation) at 406-247-7314.

Russian and American Scientists Exchange Knowledge

During April and May, 1995, Dr. Kent Keenlyne and Carlos Echevarria of the US Fish and Wildlife Service visited several sturgeon hatcheries in Russia to observe propagation and rearing of sturgeon, the catching grounds near the Caspian Sea, and the processing facilities in Astrakhan. During June, their host Evgeniy Artyukhin, visited Gavins Point NFH and other facilities in South Dakota, North Dakota, and Montana to observe and participate in sturgeon spawning activities. Herb Bollig, Hatchery Manager at Gavins Point NFH, hosted Mr. Artyukhin while he was in the U.S. Both Dr. Keenlyne and Mr. Bollig concluded their experiences were very educational and rewarding, and recommended continuation of sturgeon scientist exchange programs. Planning is underway to bring another Russian to assist with spawning pallid sturgeon this spring in North Dakota. The Russians have a wealth of knowledge on sturgeon propagation. Contacts: Kent Keenlyne 605-224-8693, or Herb Bollig 605-665-3352.

Shovelnose Sturgeon Reintroduction Planned for Bighorn River

The Wyoming Game and Fish Department proposes to reintroduce shovelnose sturgeon to the Bighorn River between Worland, Wyoming, and the Bighorn Reservoir. The purposes of the proposed project are: 1) to re-establish shovelnose sturgeon in their historical native range of the Bighorn River basin, 2) to provide an additional sport fishery for anglers in the Bighorn River basin, and 3) to enhance biodiversity in the Bighorn River. The Department proposes to re-establish shovelnose sturgeon populations through a combination of stocking fry and juvenile sturgeon. For more information contact Tom Annear (Wyoming Game and Fish Department) at 307-777-459.

Missouri River Master Manual Review Extended

In response to substantial written and public hearing comments on the Corps' Draft Environmental Impact Statement (DEIS), the Corps has extended the Master Manual Study to conduct additional studies and prepare a supplemental or revised DEIS in 1997. The Master Manual is the umbrella document that provides the guidance and criteria for reservoir storage and dam releases, and establishes priorities for project purposes. The Fish and Wildlife Service has promoted an ecosystem approach to the development of environmental operations alternatives that mimic a natural hydrograph and improve the environmental health of the

system. For additional information, contact Roger Collins (USFWS), 701-250-4492.

Recovery Team Member Replaced

Al Sandvol, Project Leader for the Missouri River Fish and Wildlife Management Assistance Office in Bismarck, North Dakota, and Pallid Sturgeon Recovery Team member since 1990, retired in 1993. His position on the Recovery Team was replaced by Dr. Kent Keenlyne, Missouri River Coordinator for the Fish and Wildlife Service in Pierre, South Dakota.

MICRA Study on Sturgeon in Lower Missouri and Middle Mississippi River

The States of Missouri, Iowa, Nebraska, Kansas and Illinois, who are party to the Mississippi River Interstate Resource Cooperative Association (MICRA), have entered into a study agreement with the Fish and Wildlife Service and the Midwest Science Center of the National Biological Service (NBS). The study agreement objective is to document relative abundance, distribution, and habitat association characteristics of pallid sturgeon and associated fish species at select sites on the lower Missouri River from Gavins Point Dam to the mouth of the Middle Mississippi River from Lock and Dam 26 tailwaters to the Missouri and Arkansas border. NBS will complete detailed bathymetric surveys on up to 15 project sites. MICRA is an organization of Mississippi River Basin states and their cooperating entities, formed in 1991, who have

agreed to develop cooperative efforts to improve the management of interjurisdictional fisheries resources of the Mississippi River Basin. Field work is expected to begin in the spring or fall of 1996. Contact: Jim Milligan (USFWS) 573-876-1911.

Annotated Bibliographies on Fishes of Concern

The South Dakota Cooperative Fish and Wildlife Research Unit at South Dakota State University has published an annotated bibliography on pallid sturgeon journal publications and unpublished reports through 1994. The bibliography is authored by Kent D. Keenlyne of the Fish and Wildlife Service, and Walter G. Duffy and Charles R. Berry of the Research Unit. Included are annotations for 123 references and an update on the biology of pallid sturgeon.

Dr. Bob White of the Cooperative Fishery Research Unit at Montana State University is preparing annotated bibliographies on the sturgeon chub, sicklefin chub, blue sucker, flathead chub, western silvery minnow, and plains minnow. They are scheduled for completion this summer. For a copy of the pallid sturgeon bibliography, contact Mark Dryer at 701-250-4419.

Pallid Sturgeon Mounts Available Soon

The Fish and Wildlife Service has contracted with a taxidermist in Minnesota to mount a 40 pound pallid sturgeon that died in the hatchery. Fiberglass recreations of the mount will be made available

at a cost of around \$250. Contact: Steve Krentz, (USFWS), 701-250-4419.

Platte River Sturgeon Being Studied

A study is underway on pallid sturgeon and shovelnose sturgeon in the lower Platte River of Nebraska to: 1) determine use of the lower Platte River by sturgeon, 2) document the size, age structure, and growth characteristics, 3) document habitat use by different size classes of sturgeon and associated benthic fishes, 4) document movement patterns, and 5) document food habits. A detailed analysis of current sturgeon populations and angler use of these fish in the Platte River will provide important baseline data needed with the recovery planning for pallid sturgeon. The study is being conducted under the direction of Dr. Edward Peters, University of Nebraska, Lincoln.

Pallid Sturgeon Population Estimated

The Missouri River Fish and Wildlife Management Assistance office in Bismarck, North Dakota, has conducted a population estimate of pallid sturgeon in the Missouri River and Yellowstone River confluence area of northwestern North Dakota and northeastern Montana. Based on recaptures that occurred from 1993 to 1995, a Schnabel multiple-census population estimate was calculated. The population was estimated to be 250 (183-340, 95% CI) individuals. All pallid sturgeon captured were adults. Contact: Steve Krentz, USFWS, 701-250-4419.

Pallid Sturgeon Studies Above Ft. Peck Reservoir

Report submitted by Bill Gardner, Montana Department of Fish, Wildlife and Parks.

Montana Department of Fish, Wildlife and Parks has been conducting a pallid sturgeon population status study in the Missouri River upstream of Ft. Peck Reservoir since 1990. The objectives are to determine abundance, distribution, evaluate reproductive success and determine important habitat conditions and areas.

During the 1995 field season we captured five different pallid sturgeon; three were "new" fish, the other two were recaptures. To date, we have captured 27 different pallid sturgeon, 4 of which appear to have hybrid characteristics (long inner barbels & barbel attachment farther from mouth than normal). The average fork length = 52.5" and weight = 33.4 lb. Most of the pallid sturgeon were between 50-55 inches FL. Pallid sturgeon this size are probably 30-40 years old.

Ten of the 27 pallid sturgeon have been recaptured at least once. Evaluation of tagged pallid sturgeon compared with untagged (new) pallid sturgeon can be used for estimating the number of pallid sturgeon in the area. A very ball park estimate that I come up with is 43 (range of error is 27-124). This compares with the Yellowstone pallid sturgeon population estimate of 250.

Are the pallid sturgeon reproducing? In 1994, we captured a female pallid sturgeon that was in spawning conditions

(based on blood samples). In 1995, we caught a female pallid sturgeon that was discharging eggs (probably in act of spawning or just completed). This pallid sturgeon was captured near Grand Island, approximately 35 miles upstream of Fort Peck Reservoir. This area most likely has a spawning site nearby. We have also been sampling for sturgeon larvae and found only a few in 1994 and 21 in 1995. We cannot identify if the sturgeon larvae are pallid sturgeon or shovelnose sturgeon until the taxonomy of the two are worked out. So pallid sturgeon are still attempting to spawn, but we have no recent evidence of successful reproduction. It could be the last successful reproduction occurred over 25 years ago.

We also have been sampling for juvenile sturgeon with a benthic trawl. In 1994, we captured only one YOY shovelnose sturgeon and in 1995 a total of 40 were sampled. These sturgeon were sampled in the lower 10 miles of the river.

We feel that continued efforts at studying the pallid sturgeon population status will not reveal significantly more information, so at this time we will shift the study emphasis to prepare for evaluating the eventual pallid sturgeon reintroduction. This will involve establishing a systematic monitoring program that will measure the response of the proposed introductions. Sampling sites and methodologies will be established so that sampling will be effective, yet reproducible and comparable of future efforts. Efforts will be directed at evaluating the adult and juvenile abundances using drifting nets, benthic trawl and radio telemetry.

The balance of my time will be directed at evaluating the effects of restoring natural flows in the Marias River downstream of Tiber Dam on the resident and migratory fish species. Contact: Bill Gardner (MTDFWP), 406-538-4658.

Gavins Point Hatchery Makes Improvements for Pallid Sturgeon

During Fiscal Year 1992, the Gavins Point NFH constructed a 70' x 42' metal pole building containing 10 circular fiberglass tanks with lake and well water supply systems. This building now contains eight adult pallid sturgeon captured in three different areas of the main stem Missouri River in North and South Dakota. Additionally, juvenile pallid sturgeon and pallid X shovelnose sturgeon hybrids are being maintained and reared within this building to obtain information on handling techniques, optimum water temperatures, proper rearing units, diseases, chemicals, spawning, INAD investigations, egg incubation, feeds and feeding, tagging, sexing, rearing densities, genetics, public information, stocking, etc.

Since the beginning of Fiscal Year 1996, the hatchery crew has completed the construction of a 105 ft. x 60 ft. permanent fish culture facility for culturing endangered species and "species of concern" native to the Missouri River system. This building contains 40 circular fish culture tanks, an egg incubation system, and a large 17 micron rotary-drum micro strainer connected to a 100,000 microwatt-second ultraviolet light disinfection unit, which will provide filtered and purified water to all life stages of

fish cultured within this building. This "Endangered Species Building" contains an office/lab, handicapped restroom, and fish culture/mechanical support areas. This building now contains juvenile paddlefish and shovelnose sturgeon used for DNA and developmental studies, breeding and imprinting (thyroxine) analysis. Contact: Herb Bollig (USFWS), 605-665-3352.

Sturgeon Chub and Sicklefin Chub Listing Status

The sturgeon chub and sicklefin chub were approved for category 1 status on July 11, 1994. Category 1 taxa are taxa for which the Fish and Wildlife Service has on file sufficient information on the biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.

On August 8, 1994, the Service received a petition from American Rivers, the Environmental Defense Fund, Mni Sose Intertribal Water Rights Coalition, National Audubon Society, and Nebraska Audubon Council to list the sturgeon chub and sicklefin chub as endangered species. North Dakota Field Office for Ecological Services has the lead to respond to the petition. A positive 90-day Finding was published in the Federal Register on January 18, 1995. Subsequent Congressional bills instituted a moratorium on listing packages, and thus, have delayed completion of the listing process. Contact: Roger Collins, USFWS, 701-250-4402.

Missouri River Bank Stabilization Mitigation Sought

The objective of this project is to mitigate and restore Missouri River fish and wildlife values lost as a result of construction of the Missouri River Bank Stabilization and Navigation Project first authorized by Congress in 1912. In 1945, Congress authorized a nine-foot deep by 300-foot wide navigation channel from Sioux City to the mouth at St. Louis, a distance of 735 miles. The project cut off channels, eliminated numerous bends, chutes, and backwaters; restricted the channel and stabilized the banks by the use of dikes, jetties, and rock revetment; and created a self-cleaning navigation channel with high-water velocities. It shortened the river by about one-third (795 miles); eliminated 100,300 acres of aquatic habitat and 65,300 acres of islands and sandbars; and eliminated 309,000 acres of riparian timber, sandbars, and other habitat types within the active erosion belt. Annual Operation and Maintenance funds are used by the Corps for maintenance dredging, structure modifications, and repairs.

In 1980, the Fish and Wildlife Service prepared a Fish and Wildlife Coordination Act Report on the Missouri River Bank Stabilization and Navigation Project for the Corps of Engineers. This report describes the impacts caused by the project and recommends restoration measures to mitigate the losses and degradation of fish and wildlife habitat. The Water Resources Development Act of 1986 authorized the Mitigation Project and \$51.9 million for the

mitigation of fish and wildlife resource losses from the channelization, bank stabilization, and navigation project. The Service has worked with the Corps and the States of Nebraska, Iowa, Kansas, and Missouri to identify mitigation sites and design projects. Funding has been appropriated every year since 1990. If fully implemented, the Mitigation Project will preserve and restore 3,200 acres of aquatic habitat, and 44,900 acres of terrestrial habitat through development of habitat on public lands and acquisition and development on private lands. About 65 percent of the total habitat development is allocated to the Kansas/Missouri reach of the river. Overall, the project will mitigate only 2 percent of the aquatic habitat and 7 percent of the terrestrial habitat losses attributable to the project. At the start of fiscal year 1996, approximately \$50 million was available to the Mitigation Project. Contact: Mike LeValley (USFWS) 314-876-1911.

Missouri River Corridor Project Restores Habitats

The objective of this project is for Federal, State, Tribal, and local governments to work together toward the identification, evaluation, planning, acquisition, restoration, and management of environmentally degraded sites on the Missouri River in South Dakota, Nebraska and Iowa. In 1989, the Army Corps of Engineers initiated the Missouri River Corridor Study for the Papio-Missouri River Natural Resource District in Nebraska and identified more than 40 sites for potential restoration and

enhancement of environmental, cultural, and recreational resources. Since then, other partners, including the Fish and Wildlife Service, National Park Service, Nebraska Game and Parks Commission, Iowa Department of Natural Resources and county conservation boards, local governments, and recreation and environmental organizations have joined the effort. As a sponsor agency, Papio acquires fee title or easements to Missouri River restoration sites, develops plans for operation and maintenance, and turns over responsibility for management to a partner agency such as the Service (e.g., Boyer Chute). Once a project is complete, the Corps reimburses the sponsor agency for 75 percent of total project costs, including acquisition and rights-of-way. Participating agencies are focusing on 12 priority sites. To date, Papio has acquired three sites and an easement to a fourth site.

The Missouri River Corridor Project in South Dakota is an expansion of the effort in Nebraska and represents a comprehensive planning effort, involving public inputs, for the identification and enhancement of natural, cultural/historic, and public recreation resources along a 10 county segment of 528 miles of the Missouri River. Individual sites will be linked in a coordinated, comprehensive implementation plan which is scheduled for completion in June 1996. In 1994, the Fish and Wildlife Service provided the North Central Resource Conservation and Development Association with a challenge grant for \$12,750 to pursue the Corridor Project. An Action Team of agency and organization representatives

coordinates the planning effort for the Corridor Project. The National Park Service has provided funds and a facilitation coordinator for the project. Contacts: Steve Anschutz (USFWS), for Nebraska and Iowa, 308-382-6468; or Sharon Whitmore, (USFWS), for South Dakota, 605-224-8693.

Missouri River Refuge Acquisition Planned

The Fish and Wildlife Service is looking to complement existing Missouri River restoration efforts by the acquisition of 60,000 acres of flood-damaged lands and floodplain lands that can be reconnected to the river, and management of these lands as a Missouri River National Fish and Wildlife Refuge. Acquisition would be from willing sellers.

The Flood of 1993 and 1995 caused extensive damage on the lower Missouri River, but also provided the opportunity to purchase tracts with high potential habitat value at a low cost. The purpose of the Service's acquisition program is to restore fish and wildlife habitat, restore natural flood plain functions, and where compatible, provide increased public access to the river and riverine habitat. The Service currently has the authority to use Land and Water Conservation Funds and emergency appropriations related to the flood to pursue acquisition in Missouri. Funds are leveraged when possible by acquisition of lands enrolled in the Wetland Reserve or Emergency Wetland Reserve Program. High priority areas have been identified from Plattsmouth, Nebraska, to St. Louis, Missouri. The Big Muddy National Fish and Wildlife Refuge was authorized by

Congress in 1994. The Service has completed environmental assessments on 7 tracts of land totaling 17,000 acres between Kansas City and St. Louis, Missouri, and has purchased approximately 2,000 acres to date. Contact: Judy McClendon, (USFWS), 573-222-6001.

National Park Service Planning National Recreation River Future

A 59-mile segment of the Missouri River from Gavins Point Dam, South Dakota, downstream to Ponca State Park, Nebraska, was authorized as a National Recreation River by Congress in 1978. An additional 39-mile segment of the river from Fort Randall Dam, South Dakota, east to the headwaters of Lewis and Clark Lake, South Dakota, was designated in 1991. In 1991, the National Park Service was directed to develop or revise existing General Management Plans and boundaries for these reaches of river. An interagency Planning Team, including the Fish and Wildlife Service, is close to completing draft plans. The National Park Service will issue the draft plans and associated environmental impact statements in spring 1996. Contact: Dave Allardyce (USFWS), 605-224-8693.

Sturgeon Character Index Developed

The Missouri River Fish and Wildlife Management Assistance Office of the Fish and Wildlife Service in Bismarck, North Dakota, has developed a character index for distinguishing pallid sturgeon from shovelnose

sturgeon. This index was developed using six morphological measurements retrieved from the range-wide database on pallid sturgeon captures. The character index is proposed for use during propagation to identify sturgeon that have pallid characteristics. For copies of the calculations, contact Steve Krentz (USFWS), 701-250-4419.

Study completed on Habitat and Movements of Pallid and Shovelnose Sturgeon

Thesis abstract provided by Robert G. Bramblett, Ph. D. Candidate, Montana State University: Habitat use and movements of the endangered pallid sturgeon and the closely related shovelnose sturgeon are poorly known. Using radio and sonic telemetry, I obtained observations of microhabitat and macrohabitat use and movements on 24 pallid and 27 shovelnose sturgeon in the Yellowstone and Missouri Rivers in Montana and North Dakota. Pallid sturgeon preferred sand and avoided gravel/cobble substrates. Shovelnose sturgeon preferred gravel/cobble and avoided sand substrates, although individual shovelnose sturgeon were variable in substrate use. Pallid sturgeon used depths ranging from 0.6 to 14.5 m, while shovelnose sturgeon used depths ranging from 0.9 to 10.1 m. Median depths at pallid sturgeon locations were significantly greater than at shovelnose sturgeon locations, and there was significant variation in mean depths among individual pallid and shovelnose sturgeon. Pallid and shovelnose sturgeon used bottom current velocities

ranging from 0 to 1.37 m/s, and 0.02 to 1.51 m/s, respectively. Mean bottom current velocities were significantly greater at shovelnose sturgeon locations than at pallid sturgeon locations, although analysis of variance indicated that difference was due to location in the Yellowstone River versus the Lower Missouri River. Pallid sturgeon were most often relocated in the lower 28 km of the Yellowstone River in spring and summer and in the Lower Missouri River in fall and winter. Shovelnose sturgeon were most often relocated in the 114 km of the Yellowstone River from the Intake diversion dam to the confluence in all seasons. Only rarely were either species relocated in the Upper Missouri River. Pallid sturgeon aggregations in late spring and early summer indicate that spawning may occur in the lower 13 km of the Yellowstone River. Home range of both species ranged to over 250 km. Both species moved during both day and night and less during fall and winter than during spring and summer. Linear regression models suggested that discharge and photoperiod may be important environmental cues for movements of both species. Pallid sturgeon used moderately diverse, dynamic macro habitats while shovelnose sturgeon were less selective in macrohabitat use. Substantial differences in habitat use and movements between adult pallid and shovelnose sturgeon indicate that shovelnose sturgeon have limited utility as pallid sturgeon surrogates.

Pallid Sturgeon Telemetry Study on Lower Missouri and Middle Mississippi River

The National Biological Service office in Columbia, Missouri initiated a study in 1995 to monitor pallid sturgeon movements and habitat use on the navigable portion of the lower Missouri River and middle Mississippi River. Fish were surgically implanted with sonic telemetry tags. A network of monitoring buoys were placed at intervals along the river to record identity, time and direction of travel of individual fish over the long term. Manual tracking will be used to identify habitat use. The report will identify sites and describe the characteristics of the habitats where pallid sturgeon are found. The report will also describe frequency and distribution of sturgeon by sex and age class. GIS data bases may allow modeling to identify available habitat in other river reaches. Contact: Ed Little (NBS), 314-876-1896.

Pallid Sturgeon Research Published

Dr. Kent Keenlyne, a member of the Pallid Sturgeon Recovery Team, has published eight papers related to pallid sturgeon. They are: 1.) Keenlyne, K. D. and P. D. Evenson, (1993), Standard and Relative Weight for the Pallid Sturgeon, *Proc. S.D. Acad. Sci.*, Vol. 72; 2.) Keenlyne, K. D. and C. J. Henry, (1994), Morphometric Comparisons of Upper Missouri River Sturgeons, *Transactions of the American Fisheries Society*, Vol. 123; 3.) Keenlyne, K. D., (1995), Recent North American Studies on Pallid Sturgeon,

Proceedings of International Symposium on Sturgeons, Moscow, Russia; 4.) Keenlyne, K. D., (1993), Resolving Resource Management Conflicts Between Listed and Unlisted Species on Large Rivers, *Proceedings of symposium on Restoration Planning for the Rivers of the Mississippi River Ecosystem*; 5.) Keenlyne, K. D., (1994), Hybridization Between The Pallid and Shovelnose Sturgeons, *Proc. S.D. Acad. Sci.*, Vol 73; 6.) Ruelle, Richard and Kent Keenlyne, (1994), The Suitability of the Shovelnose Sturgeon as a Surrogate for the Pallid Sturgeon, *Proc. S.D. Acad. Sci.*, Vol 73; 7.) Keenlyne, K. D. And S. J. Maxwell, (1993), Length Conversions and Length-Weight Relations for the Pallid Sturgeon, *North American Journal of Fisheries Management*, Vol. 13; 8.) Keenlyne, K. D., (1993), Age at Sexual Maturity of the Pallid Sturgeon, *Transactions of the American Fisheries Society*, Vol. 122. Contact: Kent Keenlyne, USFWS, 605-224-8693.

Habitat Utilization by the Pallid Sturgeon in the Middle Mississippi River

Dr. Robert Sheehan, Southern Illinois University - Carbondale, has initiated a telemetry study on pallid sturgeon in the Mississippi River between the mouths of the Missouri and the Ohio Rivers. The study objective is to obtain information on habitat uses by wintering and spawning pallid sturgeon in the study area. The Army Corps of Engineers is engaged in construction and maintenance of the 9-foot navigation channel in the study

area and feasibility studies are underway for construction of new locks at existing dams, which will increase barge traffic. Aggregate is also mined from the channel in the study area. This research will aid assessment of impacts associated with these developments. Six fish are being tracked through the winter.

Pallid Sturgeon Recovery Team Members

Mark Dryer (Leader), US Fish and Wildlife Service, Bismarck, North Dakota.

Dr. Frank Chapman, University of Florida, Gainesville, Florida.

Kim Graham, MO Department of Conservation, Columbia, Missouri.

Dr. Kent Keenlyne, US Fish and Wildlife Service, Pierre, South Dakota.

Doug Latka, US Army Corps of Engineers, Omaha, Nebraska.

Bobby Reed, LA Department of Wildlife and Fisheries, St. Charles, Louisiana.

James Riis, SD Game, Fish and Parks Department, Pierre, South Dakota.

Dr. Phil Stewart, MT Department of Fish, Wildlife and Parks, Miles City, Montana.

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